



U.S. Fish & Wildlife Service

# Currents

## REGION 2 – SOUTHWEST REGION

### *Fisheries Program Highlights*

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*Edited by Mark J. Brouder, Arizona FRO*

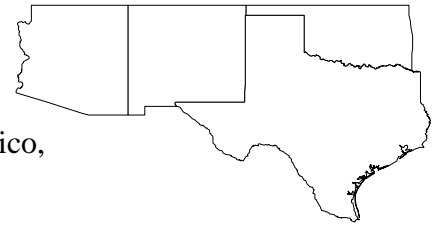


**Arizona FRO biologists process endangered razorback suckers collected from a pond on Imperial National Wildlife Refuge**

*Read the complete story on Page 3*

## REGION 2 – SOUTHWEST REGION

The Southwest Regional Office, located in Albuquerque, New Mexico, administers 12 fisheries field stations in Arizona, New Mexico, Oklahoma, and Texas.



The Division of Fishery Resources in the Southwest encompasses 3 Fishery Resources Offices, 5 National Fish Hatcheries, 3 Fish Technology Centers, and 1 Fish Health Center. The Division of Fishery Resources also has responsibility to control aquatic invasive species.

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### Fishery Resources Offices

The 3 Fishery Resources Offices (Arizona Fishery Resources Office, New Mexico Fishery Resources Office, and Oklahoma Fishery Resources Office) evaluate wild native fish stocks and their habitats, and, where feasible, work with partners to restore habitats and fish populations.

These offices provide technical fish management assistance to tribes and other partners with a primary focus on native and interjurisdictional species.

### National Fish Hatcheries

The National Fish Hatcheries (Willow Beach, Alchesay-Williams Creek, Uvalde, Tishomingo, and Inks Dam) develop and maintain brood stocks of important fish species, both sport fishes and critically imperiled non-game fishes. The hatcheries are the source of fish and eggs distributed to partners with similar aquatic conservation missions, such as native fish restoration or fulfilling federal mitigation responsibilities.

Hatcheries are often called upon to provide a place of refuge for imperiled aquatic organisms, such as aquatic plants and amphibians.

### Fish Technology Centers

The Fish Technology Centers (Dexter, Mora, and San Marcos) develop leading-edge technology for use by tribal, state, and federal fish hatcheries and fishery biologists to make fish culture more productive, cost-effective, and scientifically sound.

Technology improves hatchery efficiency, helps ensure the genetic integrity of fishes, at the same time minimizing the effects of hatchery fish on wild fish stocks.

Private aquaculture industry also benefits from scientific information generated by the Fish Technology Centers.

### Fish Health Center

Fish Health Center biologists assess the well-being of fish that live in the wild or are raised at hatcheries. Fish health

biologists are highly trained in various scientific disciplines, like immunology, epidemiology, toxicology, and genetics. They apply that knowledge in fish health assessments that might lead to early detection of potentially devastating diseases, prescribing preemptive measures.

The National Wild Fish Health Survey allows biologists to assess wild stocks and to share scientific findings with other scientists or the public through a national database.

Fish health assessments at state and federal hatcheries promote good fish culture and ultimately better, healthier fish stocks.

The U.S. Fish & Wildlife Service's fish health program takes a proactive and cooperative approach, networking with other health professionals to ensure healthy fisheries.





-USFWS  
Scenic view of the Rio Tutuaca Basin,  
Mexico.

### **New Mexico FRO Leads Native Fish Surveys of the Rio Tutuaca Basin, Mexico**

Working with the World Wildlife Fund – Mexico (WWF), Tutuaca Mountain Center, New Mexico Department of Game and Fish, and University of New Mexico biologists, the New Mexico FRO led a fisheries inventory of the upper Rio Tutuaca. The New Mexico FRO provided equipment and expertise in conducting baseline inventory sampling of 5 mainstem and 7 tributary localities. Objectives of these surveys were to characterize the resident fish community, identify threats to native fishes, provide training to WWF biologists and private land owners, collect trout and catfish specimens and tissues for ongoing taxonomic studies, and identify management needs to ensure protection of native fishes. The collecting permit was provided to NMFRO as a sub-permit by the Instituto de Biología, Universidad Nacional Autónoma de México. All specimens and tissues retained are to be accessioned to the collection of fishes at Universidad de Sonora, Hermosillo.

During sampling, seven fish species were collected, all presumably native. Common native species collected were the Yaqui sucker, Cahita sucker, Minaca chub, Mexican stoneroller, and ornate minnow. In addition, two less common species, and presumably native, were collected. Yaqui trout are known from elsewhere in the Rio Yaqui Basin and specimens collected from three Rio Tutuaca tributary streams appeared to be native. In addition, the catfish, which appear to be the native Yaqui catfish, were also collected from three mainstem localities.

Tissue samples (fin clips) from all specimens were retained and will be submitted to ongoing taxonomic studies by Mexican ichthyologists. Future work planned includes additional surveys to further characterize the resident fish community in the Rio Tutuaca Basin and evaluate potential for nonnative fishes invasion. These data will be provided to Mexican government and university biologists, NGOs such as the WWF, and private landowners to aid in management and protection of these unique Mexican native fish species.

**Jim Brooks, New Mexico FRO**



-USFWS  
Native trout collected in the Rio Tutuaca  
Basin, Mexico.

### **Razorback Sucker Recovery Efforts Continue on the Imperial National Wildlife Refuge**

Biologists from the Arizona FRO spent 2 weeks salvaging endangered razorback suckers from one of several ponds located on the Imperial National Wildlife Refuge currently being managed for native fish recovery. A total of 1,100 razorback suckers were salvaged, uniquely marked with a Passive Integrated Transponder, or PIT tag, and released into the lower Colorado River. Two years prior to this recent salvage effort, Arizona FRO biologists collected wild larval razorback suckers and transferred them to the Willow Beach National Fish Hatchery, where they were fed and allowed to grow to approximately 4 inches in length, at which time they were stocked into the pond on the Refuge. Over the past 2 years, these 4-inch razorback suckers grew approximately 12 inches before being released into the wild. Fish were salvaged from this pond because efforts by the Bureau of Reclamation to reconstruct this and several other ponds located on the Refuge are underway. Once reconstruction is complete, a total of approximately 75 acres of new habitat will be available for native fish recovery efforts.

**Mark Brouder, Arizona FRO**





-USFWS

*Box culverts allow for easier passage of fish during both low and high-water flows.*

### **Oklahoma FRO Improves Fish Passage for Native Fishes**

The Oklahoma FRO signed cooperative agreements with Aquistipace Properties, John Hancock Timber Industries, and the Eastern Shawnee Tribe to help improve fish passage in Oklahoma. Four construction projects were completed in 2005 and additional projects have been identified for 2006. Fish-friendly river and stream low water crossings have been constructed, replacing original crossings to aid in fish passage. Original low water crossings such as embedded culverts present an impediment to fish passage because narrow openings and high flows lead to high water velocities and stream bed cutting, causing waterfalls. At low water periods, these waterfalls make it difficult for fish to pass through. Some of the species that low water crossings affect are the Ouachita shiner and Arkansas darter (species of concern), leopard darter (federally and state threatened) and Neosho madtom (federally threatened).

**Brent Bristow, Oklahoma FRO**

### **Oklahoma FRO Continues Paddlefish Sampling in Several Reservoirs**

In December 2005, Oklahoma FRO staff began paddlefish sampling using monofilament gill nets at Kaw Lake, Lake Oologah, and Lake Texoma. Among the three lakes, 47 paddlefish were captured, lengths and weights were taken, and all fish were jaw tagged and released back to their capture location. The Oklahoma FRO continues to monitor populations in all three lakes. Based on results in December, all three lakes are showing evidence of natural recruitment. Paddlefish sampling will continue into late February 2006, and the information collected will be used to make future stocking decisions and population assessments for the species.

**Brent Bristow, Oklahoma FRO**



-USFWS

*One of many paddlefish collected in gillnets set by Oklahoma FRO staff.*

### **Tishomingo National Fish Hatchery Continues Alligator Snapping Turtle Research**

The Tishomingo NFH is currently studying PIT tag retention, growth, and behavior in varying water depths, and indoor and outdoor culture units. Turtles

selected to be PIT tagged were 2-3 years old and weighed between 120 – 660 grams. The PIT tags were inserted just under the skin on the right inner thigh and the skin was closed with a tissue adhesive.

A preliminary investigation found 95% tag retention approximately sixty days after turtles were released into a fenced earthen pond. Additional tagged turtles were released into the pond for a 120-day tag retention study. The turtles will be recovered from the pond at the end of February, 2006 and examined for tag retention, and growth comparisons will be made with turtles held indoors during the same time period.

Staff are also monitoring differences in behavior and growth in turtles held indoors in shallow (1-4 inches) and deep (16-20 inches) water. Observations indicate that both groups prefer to be hidden underneath or near structures in the tanks. In the deep water tanks, the 2-3 year-old turtles actually climb the structure to reach the water surface instead of swimming. The yearling turtles exhibit the same behavior, but have also been observed swimming and floating on the surface. Comparisons of growth are just beginning.

**Kerry Graves, Tishomingo NFH**



-USFWS

*Inserting a PIT tag into a juvenile turtle.*



-USFWS  
Measuring the settling rate of feces to determine relative density.

### **Mora National Fish Hatchery Conducts Study into Reducing Effluent to Meet New EPA Standards**

The Environmental Protection Agency (EPA) is developing new effluent standards and guidelines for aquaculture facilities, including federal hatcheries. New requirements include development of treatment technologies and best management practices (BMPs) for reducing the discharge of total suspended solids (TSS) and excess feed. This project proposes to develop and test feeds that will meet or exceed the new effluent requirements to be used at federal hatcheries. The aim is to demonstrate that a non-friable fecal material increases TSS and phosphorous removal from the water column. With larger particles of fecal matter there will be less breakage of fecal matter into small pieces, and therefore less leaching of soluble wastes.

Numerous studies have been conducted to determine ways to reduce phosphorous and nitrogen levels in effluent from fish rearing facilities. Fecal stability has generally not been a focus in the development of low polluting

diets. Non-friable feces will make solids easier to remove and elements such as phosphorous would be better contained, reducing leaching. Researchers have measured phosphorous leaching from feces as well as solids fractions but there has been scant work focusing on improving the characteristics of feces. By adding guar gum to the diets, feces formed should be less friable, easier to remove from the rearing unit, and leach less phosphorous.

The Mora NFH&TC is testing the study methodology on rainbow trout and will begin the study in the spring with Gila trout. Other facilities involved include Abernathy, Bozeman, and Lamar conducting trials, and Abernathy FTC producing the feed. Results look encouraging and should be available in summer 2006.

*John Seals, Mora NFH&TC*



-USFWS  
Craig Eaton, Assistant Project Leader, and Mike Figueroa, MVO, spawn Apache trout at Williams Creek NFH.

### **And...They're Off!**

**A**t the Williams Creek NFH, future Apache trout broodstock have been selected for growth and early spawning, and this year it has paid off. Under

normal circumstances, hatchery spawning begins sometime in late December or early January with just a few females ready. This year, however, spawning season took off unexpectedly during the first week of December, 2005, producing 42 ripe Apache trout. During the month of December, 192 females were spawned, giving 228,000 eggs. The females weigh an average of 1.8 pounds, producing close to 1,200 eggs per female.

During 2004, research geneticist Dr. Harold Kincaid of the USGS drafted a Genetic Broodstock Management Plan for Apache trout. This plan will guide hatchery biologists in selecting fingerling-size fish for use as broodstock two and three years later. The focus of the plan is to maintain genetic variability while producing larger offspring in a shorter period for the sport fishery program.

*Sherry White, Williams Creek NFH*

### **Pinetop Fish Health Center Relocated to Dexter, NM**

**T**he Pinetop Fish Health Center officially relocated to Dexter, NM on December 19, 2005. The office is now under the umbrella of the Dexter National Fish Hatchery and Technology Center and has been renamed the *Region 2 Fish Health Unit at Dexter*. An elite team of Service Wage Grade Professionals were brought together to complete renovations to a 20-year-old building. This team worked diligently and efficiently in constructing offices and labs to accommodate the fish health program at Dexter. The quality of



work was outstanding and all completion deadlines were met well in advance. Members of the team included Bill Williams, Fernando Urguides, Richard Gonzales, Larry Ulibarri, Scott Russell and Cody Rattin from Bitter Lake NWR, Cirilio Alonzo from Uvalde NFH and the Dexter staff. The lab will be set up and operational by mid March.

*Manuel Ulibarri, Dexter NFH&TC*



-USFWS  
New facilities for the Region 2 Fish Health Unit at Dexter.



-USFWS  
Bradley Clarkson, Fishery Biologist, and Will Thompson, Volunteer, install new walkways on deteriorating raceways.

### **Raceway Improvements Continue at Williams Creek National Fish Hatchery**

The staff at Williams Creek NFH has been working to install five new walkways on one entire bank of raceways. Crumbling concrete on the old walkways created a hazard and

the tops of the raceway walls were removed in order to install new grating. Supports were welded, concrete walls were drilled through in order to secure the supports, and new grates were welded in place. Approximately 40 hours are devoted to installation of each walkway. The process continues slowly as time permits between trout spawning, rearing, and stocking activities.

*Sherry White, Williams Creek NFH*



-USFWS  
Biologists mark Rio Grande silvery minnows before releasing them into the wild.

### **Mission Accomplished – 415,000 Threatened/Endangered Fish Returned to Nature**

The Dexter National Fish Hatchery and Technology Center recently released over 415,000 fish into the wild.

Overall, six species were represented: the Chihuahua chub, woundfin, razorback sucker, bonytail, Rio Grande silvery minnow, and Colorado pikeminnow. The habitats targeted in this restocking effort included the Mimbres, Virgin, Rio Grande, Rio Puerco, and San Juan rivers along with the lower Colorado River.

Prior to the release of the fish, a consolidated effort to mark them was undertaken by personnel from the U.S. Fish and Wildlife Service, the Bureau of Reclamation, the Albuquerque Bio-Park, and Bio-West. Once this was accomplished, Center employees loaded the fish into the Service's Regional Distribution Unit and other Center vehicles for transport to various release points. The success of the Center's conservation program is clearly due to the cooperative effort with other agencies.

*Maria Bullard, Dexter NFH&TC*



-USFWS  
Endangered razorback sucker reared at Willow Beach NFH.

### **Willow Beach National Fish Hatchery Embraces a Balanced Approach toward Aquatic Resource Stewardship**

The Willow Beach NFH embraces a balanced approach toward aquatic resource stewardship that recognizes the need to conserve and manage self-sustaining fish populations, while at the same time providing quality opportunities for responsible sport fishing. During the last three months of 2005, activities at Willow Beach NFH and its satellite facility included rearing and stocking 3,338 endangered

razorback suckers (mean total length = 33 cm) and 5,584 endangered bonytail (mean total length = 30 cm) into the Colorado River. In addition, the hatchery reared and stocked over 3,000 rainbow trout (> 25 cm) on tribal lands and over 12,000 rainbow trout (> 30 cm) for recreational fishing in the tailwaters of Hoover and Davis Dams.

*Chester Figiel, Jr., Willow Beach NFH*



-USFWS  
Staff of Inks Dam NFH and the Arizona FRO off-load sportfish for distribution on the San Carlos Apache Reservation.

### **Inks Dam National Fish Hatchery Delivers Sportfish to Arizona and Louisiana**

**F**ish production and distribution for Arizona Tribal fishery management programs for FY 2006 began in October 2005. The Quechan Indian Reservation received 24,500 channel catfish weighing 1,269 pounds, and the Hualapai Indian Reservation received 5,000 fish weighing 259 pounds. This distribution trip represents a milestone in the career of Jim Sutton, Regional Distribution Unit driver. After 34 years of government service, Jim has traveled over 1,000,000 miles distributing aquatic species for the Fish and Wildlife Service. Congratulations, Jim!

Largemouth bass were stocked on the San Carlos and Fort Apache Indian Reservations with each receiving 5,344 fish that were 7.5" in length.

In addition, Inks Dam NFH assisted the Gulf Coast Marine Fisheries Commission by stocking 1,630 phase II Gulf striped bass in the Tchefuncte River, Louisiana. This valuable program is a good example of successful partnering among many federal, state, and private organizations.

*Marc Jackson, Inks Dam NFH*



-USFWS  
San Marcos salamander.

### **San Marcos National Fish Hatchery and Technology Center Works with Texas State University on Salamander Genetics**

**T**he San Marcos salamander is well-known in the area of central Texas as one of several threatened, endemic, and spring-adapted species. This salamander is endemic to the headwaters of the spring-fed San Marcos River, living in an area of about 4.5-surface-hectares. It was federally listed as a threatened species in 1980 because of its restricted range and dependence on the springs, and conservation research has been active ever since.

Texas State University-San Marcos, in collaboration with the San Marcos National Fish Hatchery and Technology Center, has been conducting population genetics research on the San Marcos salamander and closely related species. One of the goals is to estimate effective population sizes of salamander populations in the Texas Hill Country. This estimate is calculated using sampled mitochondrial sequence variation and an assumed mutation rate for the gene sequenced. It provides a long-term average of the number of breeding females in a population. The estimate is of the number of females only because mitochondrial DNA is maternally inherited. It is important to note that a specific mutation rate for salamanders is not available, so a general vertebrate rate is used; this general rate has been applied successfully to a large number of diverse taxa. However, indirect, genetic estimates of population size are sensitive to variation in mutation rates and should be used cautiously. This technique is a particularly useful way to estimate population size for the San Marcos salamander because they are so difficult to count, given that they hide under water beneath rocks and in vegetation during the day. Based on the survey of mitochondrial DNA sequence variation, the effective population size for the San Marcos salamander is estimated to be 98,810 females. Given that the population is composed of males and juveniles as well, the actual population size is much larger than this, perhaps greater than 200,000 individuals.



Estimating effective population size is ongoing and is a part of a larger research project which examines the geographic pattern of genetic variation in Texas Hill Country salamander populations. The Center is attempting to determine whether these populations are connected either through underground aquifers or river drainage systems. This work complements similar genetics work in central Texas led by Paul Chippindale at UT Arlington. *Lauren Lucas and Dr. Chris Nice, TSU-San Marcos*  
*Joe Fries, San Marcos NFH&TC*



-USFWS  
*Stocking rainbow trout through the ice.*

### **New Mexico Tribes/Pueblos Receive Rainbow Trout**

Beginning in 2004, Alchesay-Williams Creek National Fish Complex (AWC) and Mora National Fish Hatchery-Technology Center (MNFH&TC) began redistributing catchable size and occasionally subcatchable rainbow trout to 10 New Mexico Tribes/Pueblos. In 2005, approximately 50,000 fish from AWC and 100 to 500 fish from MNFH&TC were received. In addition, Inks Dam National Fish Hatchery provides assistance

via the Regional Distribution Unit with trout distribution.

Prior to stocking, personnel from the New Mexico FRO met with each individual tribe/pueblo to discuss stocking numbers, FWS-stocking policy, and fishery management plans. Currently the Pueblos of Laguna, Isleta, Sandia, Zia, Nambe, San Ildefonso, Santa Clara, San Juan, Picuris, and the Mescalero Apache are receiving rainbow trout on an annual basis. Rainbow trout stockings begin in February and conclude in June. In addition, Inks Dam National Fish Hatchery continues to provide channel catfish on an annual basis and largemouth bass every two years to New Mexico Tribes/Pueblos.

*Chris Kitcheyan, New Mexico FRO*



### **Improvements Continue at Inks Dam National Fish Hatchery**

Hatchery staff began work on projects to replace water supply line valves, pond drain valves, plumbing and fish screens in the hatchery building and rehabilitate concrete tanks. Incoming water valves were replaced on ponds 1,



2, 3 and 4. As incoming water valves are replaced, packed columns are being retrofitted at all pond kettles to improve water quality during critical periods. *Marc Jackson, Inks Dam NFH*

### **Dexter National Fish Hatchery and Technology Center Continues to Lead in Conservation Genetics of Endangered Fish**

The woundfin is a small, highly specialized, and essentially scaleless minnow. The species historically occurred in the lower Colorado River basin. Due to environmental degradation and the introduction of exotic species, the woundfin has been extirpated from almost all of its historical range, except the Virgin River.



-USFWS  
*Endangered woundfin.*

To avert their extinction, the Dexter NFH&TC has maintained and propagated the species since the 1980s. Management has been



successful in maintaining population size, although long-term viability was never evaluated. Using six micro-satellite DNA loci, this study characterized the genetic and population structure of woundfin, and evaluated relative reproductive success between hatchery and wild populations.

The data generated from this study indicate that the wild populations have slightly higher levels of genetic diversity than the hatchery populations. A trend of divergence over time between the wild and hatchery populations was also observed. The wild X hatchery F1 progeny contained the highest diversity, and appeared to have a similar level of genetic contribution from both wild and hatchery parental populations. Based on these data, management efforts will focus on maintaining levels of genetic diversity by optimizing the breeding system of woundfin in the hatchery. We suggest using several breeding populations to increase the overall effective population size, instead of a single large population. Future research will focus on the

effective and census population size estimation of wild and hatchery populations, ecological and genetic survey of wild fish, and evaluation of adaptability of hatchery woundfin progeny for the wild environment.

*Yongjiu Che, Post-doctoral FellowDexter NFH&TC*

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### **Alchesay-Williams Creek NFH Economic Survey Completed**

The Service's Division of Economics in Arlington, Virginia recently completed a comprehensive survey of the economic impacts resulting from recreational angling for 1.2 million trout stocked on Indian reservations across 67 locations in three states by the Alchesay-Williams Creek NFH Complex during 2004. A preview of the Executive Summary of this report includes the following economic facts:

- ◆ The stocking program resulted in over **149,000 angling days** that generated **\$10.4 million** in retail sales, **\$19.3 million**

in total economic output, and **\$23.6 million** in total economic value.

- ◆ The program generated **196 jobs** with job income totals of **\$4.8 million**.
  - ◆ **Taxes** generated by the program totaled **\$1.5 million** including \$597,000 in fuel tax revenue, \$125,000 in state income tax revenue, and **\$750,000 in federal income tax revenue**.
  - ◆ The A-WC NFH **operations budget** totaled **\$743,000** in 2004, indicating **federal tax revenue generated by the program exceeded federal costs associated with operation of the facility**.
  - ◆ For the Alchesay-Williams Creek NFH Complex, **each federal dollar** of operational budget expenditure is associated with **\$31.72 of economic effects**.
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-USFWS  
Bradley Clarkson, Fishery Biologist, stocking trout into Tribal streams.

# SOUTHWEST REGIONAL FISHERIES OFFICES

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